

Notice of Allowability

Application No.

09/744,904

Examiner

Rip A. Lee

Applicant(s)

TAKAHASHI ET AL.

Art Unit

1713

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to March 7, 2006.
2. ☒ The allowed claim(s) is/are 1, 3-20, 22, 24-28, and 30-43.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

The application has been amended as follows:

Claim 3, line 4 insert "where" between "case" and "the"

Allowable Subject Matter

Claims 1 and 3-12 are allowed over the closest references, Machida *et al.* (U.S. Patent No. 5,747,620), Canich *et al.* (U.S. Patent No. 6,194,341), and Welch *et al.* (U.S. Patent No. 6,153,716).

The claims are drawn to an ethylene homopolymer or ethylene/C₄₋₂₀ α -olefin copolymer wherein (i) the methyl branches are less than 0.1 per 1000 C atoms as measured by ¹³C NMR spectroscopy, (ii) the molecular weight distribution, M_w/M_n is 1.8 – 4.5, and (iii) the intrinsic viscosity, $[\eta]$ (135 °C, decalin) is 0.2 – 18 dL/g.

Machida *et al.* teaches ethylene/ C₃₋₂₀ α -olefin copolymers having a mole ratio of methyl groups to methylene groups [CH₃/CH₂] of 0.005 to 0.1, corresponding to 5 methyl groups per 1000 methylene groups. The molecular weight distribution, M_w/M_n , of copolymers lies in the range of 1.5 – 70, and the intrinsic viscosity, $[\eta]$ (135 °C, decalin) is 0.01 – 20 dL/g. The polymer does not have the requisite branching number of less than 0.1 per 1000 C atoms.

Canich *et al.* discloses an ethylene polymer with a molecular weight distribution, M_w/M_n , of 2.4 with no short chain branching as detected by ¹³C NMR spectroscopy. No information is provided regarding the intrinsic viscosity of the polymer, and since there is no supporting information in the text, one having ordinary skill in the art would not have found it obvious to believe that the prior art material would exhibit the claimed rheological property.

Welch *et al.* teaches ethylene/butene copolymers having a molecular weight distribution, M_w/M_n , of about 2 to 2.5 and having no detectable amounts of branches other than ethyl branches, as determined by ¹³C NMR spectroscopy. No information is provided regarding the intrinsic viscosity of the polymer, and since there is no supporting information in the text, one having ordinary skill in the art would not have found it obvious to believe that the prior art material would exhibit the claimed rheological property.

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Claims 13-22 and 24-28 are allowed over the closest reference, Yamguchi *et al.* (JP 10-017617).

The claims are drawn to an ethylene homopolymer or a copolymer of ethylene and a C₄₋₂₀ α -olefin containing less than 0.1 methyl branches per 1000 carbon atoms, a polydispersity, M_w/M_n , of 5.5-50, and wherein the decane soluble components (W (% by weight)) at 23 °C and density (d (g/cm³)) satisfy the following relations:

$$W < 80 \exp(-100(d - 0.88)) + 0.1 \text{ where } \text{MFR} \leq 10 \text{ g/10 min and}$$

$$W < 80 (\text{MFR} - 9)^{0.26} \exp(-100(d - 0.88)) + 0.1 \text{ where } \text{MFR} > 10 \text{ g/10 min.}$$

Yamguchi *et al.* discloses an ethylene homopolymer having a polydispersity of 46 with no methyl branching and no branches due to hexyl or longer branches. The reference does not teach polymers exhibiting the recited relationship between W and density.

Claims 30-33 are allowed over the closest reference, Morimoto *et al.* (U.S. Patent No. 5,260,384).

The claims are drawn to an ethylene (co)polymer having: (i) a melt tension and swell ratio defined by the inequality $\log(\text{MT}) > 12.9 - 7.15\text{SR}$, (ii) a relationship between intrinsic viscosity $[\eta]$ and melt flow rate defined as:

$$[\eta] > 1.85 \text{ MFR}^{-0.192} \text{ when } \text{MFR} < 1$$

$$[\eta] > 1.85 \text{ MFR}^{-0.213} \text{ when } \text{MFR} \geq 1$$

and (iii) a relationship between weight average molecular weight and swell ratio expressed as $\text{SR} > 4.55 - 0.56 \log(M_w)$.

Morimoto *et al.* discloses a polyethylene which displays a melt tension of 70, a swell ratio of 1.9, an intrinsic viscosity of 4.71 and MFR of 2.9. Both conditions (i) and (ii) are satisfied, however, the patent does not teach polymers having the recited relationship between M_w and swell ratio.

Claims 34-38 are allowed over the closest references, U.S. Patents No. 5,731,393 to Kojoh *et al.* (U.S. Patent No. 5,731,393), Brant (U.S. Patent No. 6,294,631), and JP 8-302083.

The claims are drawn to an ethylene homopolymer or a copolymer of ethylene and a C₃₋₂₀ α -olefin having a molecular weight distribution greater than 9.2 and the ratio M_z/M_w defined by the expression, $M_z/M_w \geq 4 / (0.5 - 4.50 / ((M_w/M_n) - 0.2))$.

None of the polymers in the cited patents meets the claimed limitation of M_z/M_w .

Claims 39-43 are allowed over references cited to date. The claims are drawn to an ethylene homopolymer or a copolymer of ethylene and a C₃₋₂₀ α -olefin having at least two maxima and at least one minimum in the GPC molecular weight distribution curve in which the intensity of the minimum value (W_1) and the lower intensity of the maximum values having the minimum value between them (W_2), satisfy the inequality $W_1/W_2 < 0.85$.

The subject matter of these claims is not taught or fairly suggested in the cited references.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rip A. Lee whose telephone number is (571)272-1104. The examiner can be reached on Monday through Friday from 9:00 AM - 5:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reached at (571)272-1114. The fax phone number for the organization where this application or proceeding is assigned is (703)872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <<http://pair-direct.uspto.gov>>. Should you have questions on the access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

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May 25, 2005



DAVID W. WU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700